FOXCOM

Complete RF-2-Fiber Solutions

SATLIGHT

# 7870 Interfacility Link
# Installation and User's Guide

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## Warranty and Repair Policy

Foxcom performs testing and inspection to verify the quality and reliability of our products. Foxcom uses every reasonable precaution to ensure that each unit meets specifications before shipment. Customers are asked to advise their incoming inspection, assembly, and test personnel as to the precautions required in handling and testing our products. Many of these precautions are to be found in this manual.

The products are covered by the following warranties:

### General Warranty

Foxcom warrants to the original purchaser all standard products sold by Foxcom to be free of defects in material and workmanship for 24 months from date of shipment from Foxcom. During the warranty period, Foxcom will repair or replace any product that Foxcom proves to be defective. This warranty does not apply to any product which has been subject to alteration, abuse, improper installation or application, accident, electrical or environmental over-stress, negligence in use, storage, transportation or handling.

### Specific Product Warranty Instructions

All Foxcom products are warranted against defects in workmanship, materials and construction, and to no further extent. Any claim for repair or replacement of units found to be defective on incoming inspection by a customer must be made within 30 days of receipt of shipment, or within 30 days of discovery of a defect within the warranty period.

This warranty is the only warranty made by Foxcom and is in lieu of all other warranties, expressed or implied. Foxcom sales agents or representatives are not authorized to make commitments on warranty returns.

### Returns

In the event that it is necessary to return any product against above warranty, the following procedure shall be followed:

1. Return authorization is to be received from Foxcom prior to returning any unit. Advise Foxcom of the model, serial number, and discrepancy. The unit may then be forwarded to Foxcom, transportation prepaid. Devices returned collect or without authorization may not be accepted.
2. Prior to repair, Foxcom will advise the customer of our test results and any charges for repairing customer-caused problems or out-of-warranty conditions etc.
3. Repaired products are warranted for the balance of the original warranty period, or at least 90 days from date of shipment.

### Limitations of Liabilities

Foxcom's liability on any claim, of any kind, including negligence for any loss or damage arising from, connected with, or resulting from the purchase order, contract, quotation, or from the performance or breach thereof, or from the design, manufacture, sale, delivery, installation, inspection, operation or use of any equipment covered by or furnished under this contact, shall in no case exceed the purchase price of the device which gives rise to the claim.

EXCEPT AS EXPRESSLY PROVIDED HEREIN, FOXCOM MAKES NO WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY GOODS, PARTS AND SERVICES PROVIDED IN CONNECTION WITH THIS AGREEMENT INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. FOXCOM SHALL NOT BE LIABLE FOR ANY OTHER DAMAGE INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH FURNISHING OF GOODS, PARTS AND SERVICE HEREUNDER, OR THE PERFORMANCE, USE OF, OR INABILITY TO USE THE GOODS, PARTS AND SERVICE.

The Company's exclusive warranty and the remedy provided for breach thereof shall not apply to:

1. Any Product used or operated other than pursuant to the Company's written instructions,
2. Damage or deficiencies resulting from accident, alteration, modification, misuse, tampering, negligence, improper maintenance, installation or abuse,
3. Use of any Product other than at the Installation Site,
4. Use of any Product that is defective or damaged due to misuse, accident, or neglect, or due to external electrical stress, lightning or other acts of nature,
5. Use of any Product by a person who is not any authorized employee of the Customer, or
6. Used other than as explicitly authorized in writing by the Company.

## Reporting Defects

The units were inspected before shipment and found to be free of mechanical and electrical defects.

Examine the units for any damage which may have been caused in transit. If damage is discovered, file a claim with the freight carrier immediately. Notify Foxcom as soon as possible.

**Note** Keep all packing material until you have completed the inspection.

## Precautions

### Personal Safety

OPTICAL RADIATION

Applying power to the transmitter unit will create a laser energy source operating in Class I as defined by IEC 825-1. Use either an infrared viewer, optical power meter or fluorescent screen for optical output verification.

AC POWER HAZARD

The rackmount power supply line is EMI filtered. The chassis is connected to earth ground in compliance with safety requirements. Always use the 3-prong AC plug with earth ground to avoid possibility of electrical shock hazard to personnel.

### Equipment Safety

To avoid damaging your product, please observe the following:

1. The output of the receiver is AC coupled and can withstand the bias from a satellite receiver. **Do not exceed 25V DC bias.**
2. The input of the transmitter has an optional built-in bias for inserting DC power up the coax to the LNB. Make certain that any equipment or test equipment connected to the transmitter input can withstand this bias.
3. Do not allow any dirt or foreign material to get into the optical connector bulkheads. This may cause damage to the polished optical connector end faces.
4. The optical fiber jumper cable bend radius is 3 cm. Smaller radii can cause excessive optical loss and/or fiber breakage.
5. If multiple transmitters are installed in the chassis allow sufficient room for adequate ventilation; otherwise the units may overheat causing possible safety hazard or equipment damage.
6. Fuses: The 7180M chassis does not have fuses. If the unit fails, pull the power supply out from the chassis and then push it back in.
7. When several units are installed on one 7180M chassis, ensure that the total units' current consumption (including any LNB bias) does not exceed 6A.

# 1 Introduction to the *7870 Interfacility Link*


**1.1 Options . . . . . 2**
**1.2 Product Drawings . . . . . 3**
**1.3 Panel Descriptions . . . . . 4**
**1.4 Block Diagrams . . . . . 5**


The *7870 IFL* is a 10 – 200 MHz IF fiber optic link used primarily in short distance, single channel video applications with high input/ output power levels. The *7870 IFL* consists of an optical transmitter (7870T) which receives signals from satellite modems, video modulators, or exciters and transmits them to an optical receiver (7870R) via singlemode fiber.

The 7870T and 7870R modules plug into a 7180M, a 3U chassis and power supply, which enables expansion of the system to accommodate up to eight Sat-Light™ modules. Accessories include the Model 7001P Power Supply, the Model 2040 1:1 Redundant Switch, the Model 2100 Amplifier, and the Model 7050 Serial Optical Multiplexer, an asynchronous data transceiver.

The *7870 IFL* transmits all satellite modulation schemes - digital or analog. Any FM modulated RF signal is transmitted accurately. The RF signal is directly modulated and adds virtually no phase noise to the original signal. The direct modulation, along with extremely flat amplitude and group delay, guarantees low bit error rate (BER) and high signal quality, independent of distance.

LEDs, and back panel monitors, and alarms allow for complete system status monitoring and for interfacing with monitor and control (M&C) systems. Gain Control at the Receiver sets the RF level.

## 1.1 Options

The *7870 Interfacility Link* comes with a variety of options:

1. 50 Ω Input/Output Impedance/BNC female connector; Standard impedance is 75 Ω/BNC, female connectors.
2. Standalone unit; The 7870 IFL can be installed as a standalone unit. If the 7870 is used as a standalone, a separate power supply must be used.

On the side of the 7870T and the 7870R units is a label[1] which lists the options. Under each option is a square. If the unit includes a particular option the square under the option should be marked.

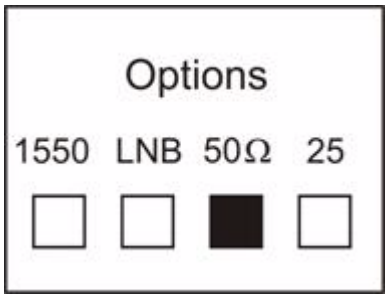



**Figure 1 Option Label**

1. The sticker includes options which are not relevant to the 7870 IFL.

## 1.2 Product Drawings

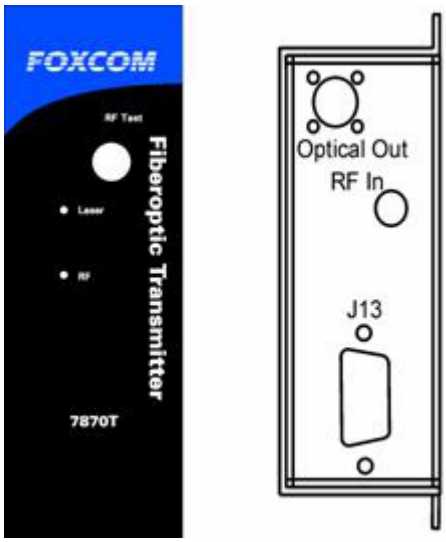



**Figure 2 7870T Transmitter Front and Rear Panel**

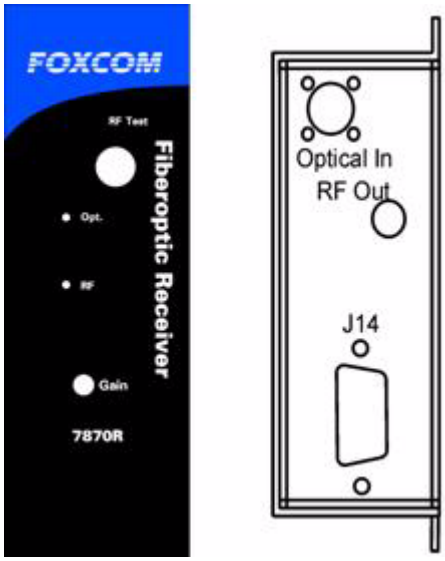



**Figure 3 7870R Receiver Front and Rear Panel**

## 1.3 Panel Descriptions

On the Front Panel of the *7870 IFL* units are two LEDs. Both LEDs should be on when the unit is in use. T

The LEDs on the Front Panel of the **7870** Transmitter and Receiver are:

| LED Name | LED Function |
|---|---|
| **Laser** | Indicates if the laser is functioning |
| **RF** | Indicates RF signal level<br>• Green: Input level is within 3 dB of specification (level is -2 to -28 dBm)<br>• Amber: Input level exceeds maximum recommended level by 3 dB or more (level is >-2 dBm)<br>• Off: Input level is below minimum recommended level by 3 dB or more (level is < -28 dBm |

**Table 1 7870T Transmitter LEDs**

| LED Name | LED Function |
|---|---|
| **Opt.** | Indicates if the optical input power is above the minimal level [≥3 dBm] |
| **RF** | Indicates RF signal level<br>• Green: Input level is within 3 dB of specification (level is -2 to -28 dBm)<br>• Amber: Input level exceeds maximum recommended level by 3 dB or more (level is >-2 dBm)<br>• Off: Input level is below minimum recommended level by 3 dB or more (level is < -28 dBm |

**Table 2 7870R Receiver LEDs**

## 1.4 Block Diagrams

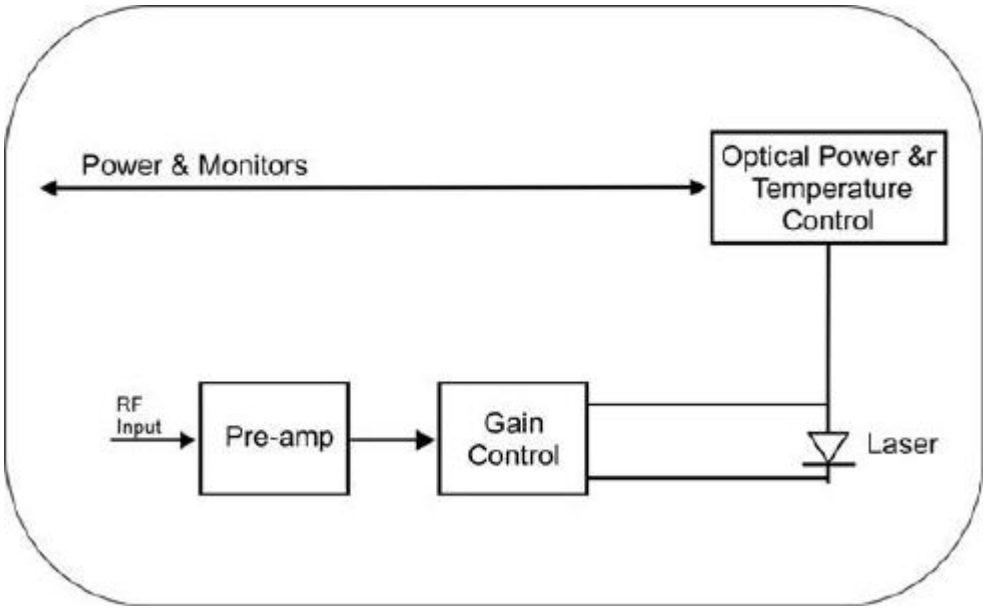



**Figure 4 7870Transmitter Block Diagram**

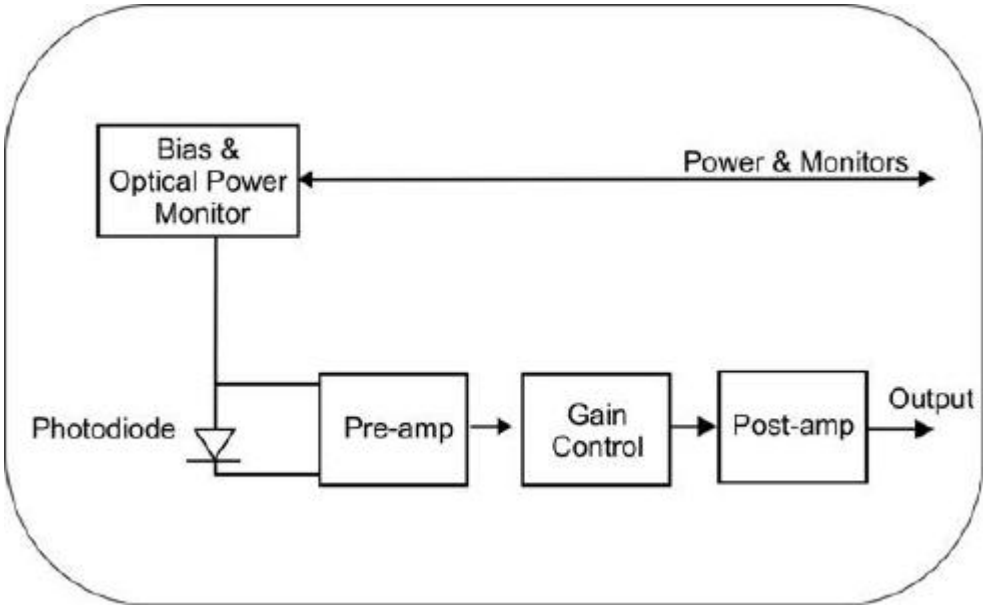



**Figure 5 7870R Receiver Block Diagram**

# 2 Installation

Chapter 2 describes how to install the *7870 Interfacility Link* units. Setting up the **7870E** Transmitter/Receiver consists of:


**2.1 Setting up the Transmitter . . . . . 8**
**2.2 Connecting the Fiber Optic Cable . . . . . 9**
**2.3 Setting Up the Receiver . . . . . 10**
**2.4 Powering the IFL . . . . . 11**
2.4.1 7180M Chassis . . . . . 12
**2.5 Connecting the Back Panel Jumpers . . . . . 13**
**2.6 Aligning the Fiber Optic Link . . . . . 15**


Observe all warnings and cautions mentioned at the beginning of this manual (See **Important Information** on page iii).

If after set-up you experience problems, see **Chapter 4 Troubleshooting** on page 25.

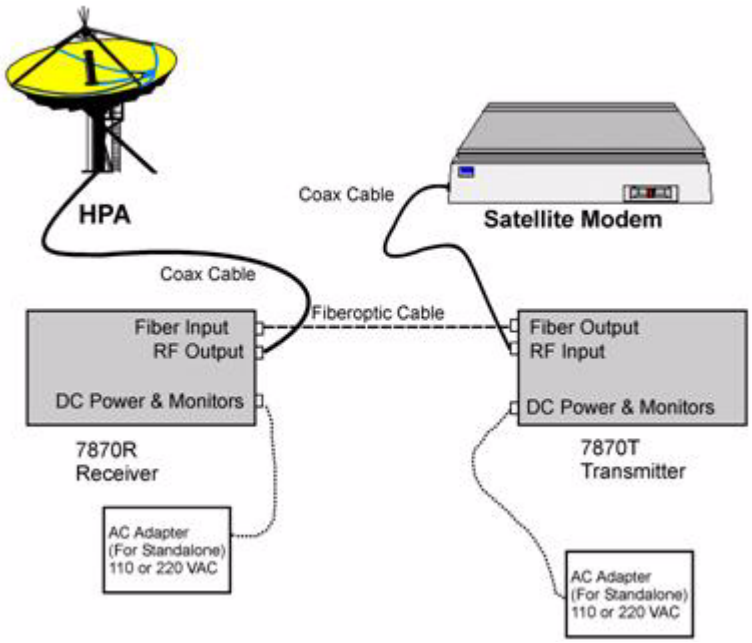



**Figure 6 Typical Application of a *7870 Interfacility Link***

## 2.1 Setting up the Transmitter

1. Place the **7870T** in the 7180M Chassis.
2. Apply AC power to the chassis. The Power Supply and Laser LEDs should be lit.
3. Using an optical power meter, measure the optical power. Insert the meter's cable into the Transmitter's optical connector. Power levels should be 0.5 mW minimum (-3 dBm).

   Alternatively, use a DVM to measure the voltage at:

   - **7180M Rackmount**: Pins J13-P17 through J13-P24 for the slot being measured (See **Table 4 7870T Transmitter Pinout** on page 20 for details regarding J13 pinouts). [7180M Rackmount]
   - **Standalone**: At pin #6 of the 9 pin connector [Standalone]

The signal level should be -4.5 ± -0.3VDC.

4. On the rear panel, connect the coax cable to the RF Input Connector. The RF LED should be lit.
5. On the rear panel, connect the fiber optic cable to the Optical Connector.

**Note** If either LED is not lit, see **Chapter 4 Troubleshooting** on page 25.

**Caution** *When monitoring the voltage outputs use only a high resistance DVM.*

## 2.2 Connecting the Fiber Optic Cable

**Before connecting the cable:**

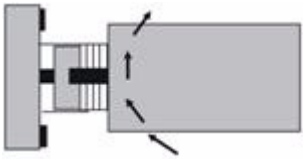
1. The fiber optic cable **must** be either fusion spliced or connected via FC/APC connectors.
2. Wipe the connector with a lint-free cotton cloth.
3. Note the polarity key of the optical connector before inserting.

**To connect the cable:**

1. Line Up the Polarity Key.


2. Insert the connector

3. Tighten the connector



**Caution** *Do not apply any glue, silicon adhesive, or any other material to the fiber optic connector!*

## 2.3 Setting Up the Receiver

1. Place the **7870R** Receiver in any of the 7180M Chassis, unless a 2040 RF Switch is installed. (See **Figure 7 7180M Chassis Rear View** on page 12.)

**Note** If a 2040 RF Switch(es) is being installed, then slots 2 and/or 5 of the 7180M are reserved for the switch(es).

2. Apply AC power to the chassis. The Power Supply's LED should be lit.
3. Using an optical power meter, measure the optical power coming to the Receiver from the fiber optic cable. The power levels of the Receiver should be the power level measured at the Transmitter minus the fiber loss[2].

   Alternatively, use a DVM to measure the voltage at:

   - pins J13-P9 through J13-P16 for the slot being measured (See **Table 5 7870R Receiver Pinout** on page 21 for details regarding J13 pinouts) (7180M Rackmount). The voltage level should be 1 V for each 1 mW measured at the Receiver input.
   - at pin #5 of the 9 pin connector (standalone)
4. On the rear panel, connect the coax cable to the RF Output Connector.
5. Adjust the Gain Control Potentiometer to give the desired output power. Using a small screw driver, turn the potentiometer (located on the front panel) to increase or decrease the gain.

**Notes**

1. The potentiometer is 10 turn potentiometer.
   - To **increase** the gain, turn the gain control clockwise.
   - To **decrease** the gain, turn the gain control counterclockwise.

   For more information see **2.6 Aligning the Fiber Optic Link** on page15.
2. If the LED is not lit, see **Chapter 4 Troubleshooting** on page 25.

2. Fiber loss is defined as:
(attenuation/km x length (km) of the fiber optic cable) + (0.5 dB × number of connectors).
For example if a signal with an optical wavelength of 1310 nm is transmitted over a link 10 kilometers long which had two connectors the loss would be:
(0.4 dB/km × 10 km) + (0.5 dB × 2) = 5.0 dB

## 2.4 Powering the IFL

- Transmitter power requirement: +14 VDC @ 200 mA
- Receiver power requirement: +14 VDC @ 250 mA.
- The Standalone Transmitter/Receiver is powered by a Foxcom supplied external DC power supply.
- The Rackmount Transmitters/Receivers are plugged into the rackmount chassis. The chassis can accept and power up to eight units.

**Note** At temperatures below10°C, the Transmitter's internal heater will require an additional 100 mA. The Transmitter's total power requirement will then be 300 mA.

**Caution** *Ensure that there is a good airflow around the chassis rackmount.*

### 2.4.1 7180M Chassis

The 7180M Chassis provides power to the plug in units. The power supply is a switching type. Each plug-in regulates its own voltage. The power supply provides:

- 14 VDC stable
- AC input; 100 - 240 VAC
- Units can be plugged in “hot standby”

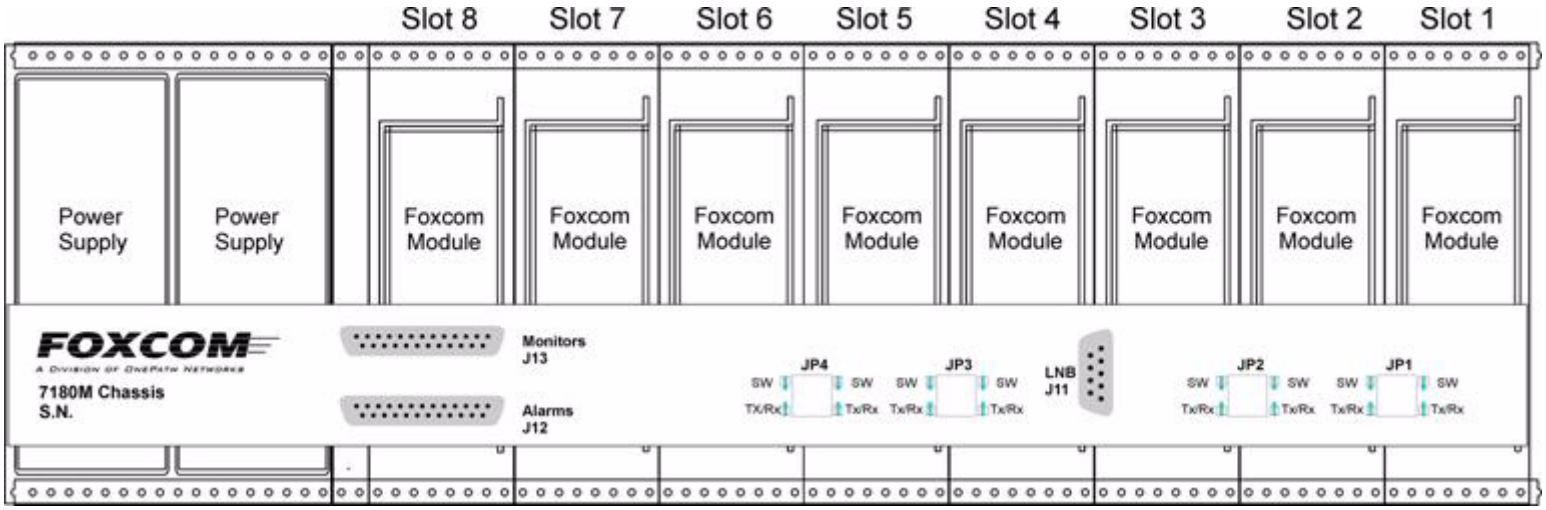



**Figure 7 7180M Chassis Rear View**

## 2.5 Connecting the Back Panel Jumpers

On the rear panel of the 7180M Back Panel are product selectors (JP1 to JP4). The 3 pin selectors (male) are the connecting point between the slots and the back panel. One pin is for the transmitter/receiver (Tx/Rx), one is for the optional 2040 1:1 Redundant Switch, and one is for the 7180M. A 2 pin jumper (female) is placed on the relevant pins to complete the connection between the 7180M and the units. For example, if a 2040 Switch is being used, the jumper is placed on the Switch-7180M pins.

**To connect the jumpers:**

1. Each jumper has two sets of pins, upper and lower. The upper pins are labeled SW (Switch) and the lower pins Tx/Rx.
2. If the 7180M has Tx or Rx units only, place all jumpers on the lower two pins.

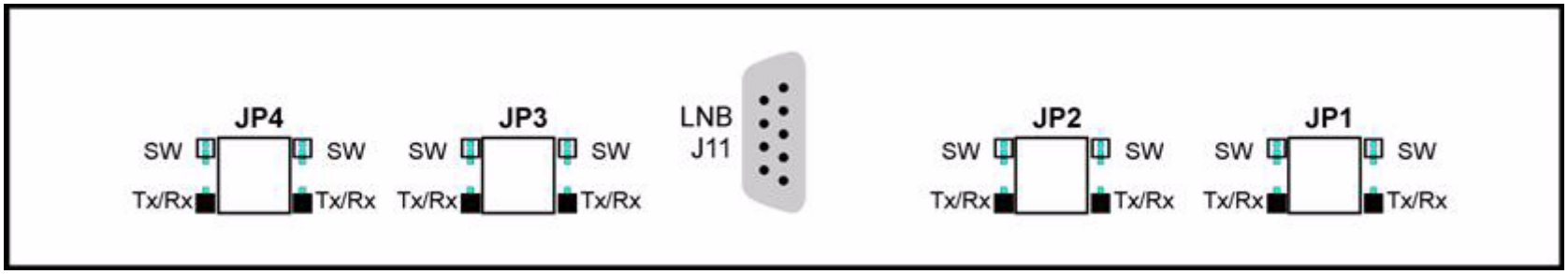



**Figure 8 Jumper Installation: Tx and Rx only**

3. If the 2040 Switch is installed in Slot 2, place the JP1 and JP2 jumpers on the higher two pins and the JP3 and JP4 jumpers on the lower two pins.

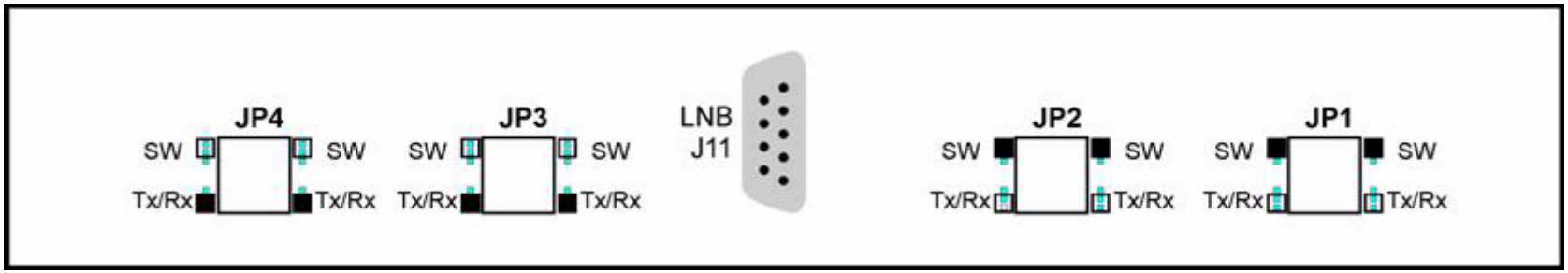



**Figure 9 Jumper Installation: 2040 Switch in slot 2**

4. If the 2040 Switch is installed in Slot 5, place the JP1 and JP2 jumpers on the lower two pins and the JP3 and JP4 jumpers on the higher two pins.

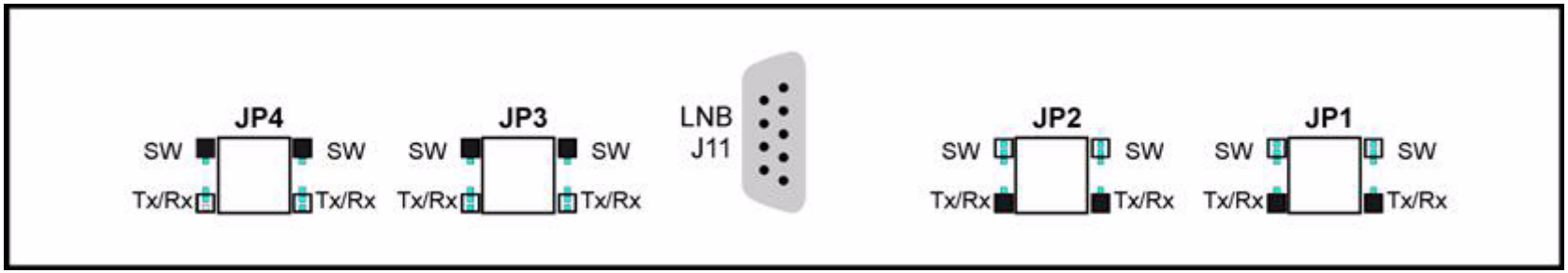



**Figure 10 Jumper Installation: 2040 Switch in slot 5**

5. If the 2040 Switch is installed in Slots 2 and 5, place the JP1, JP2, JP3, and JP4 jumpers on the higher two pins.

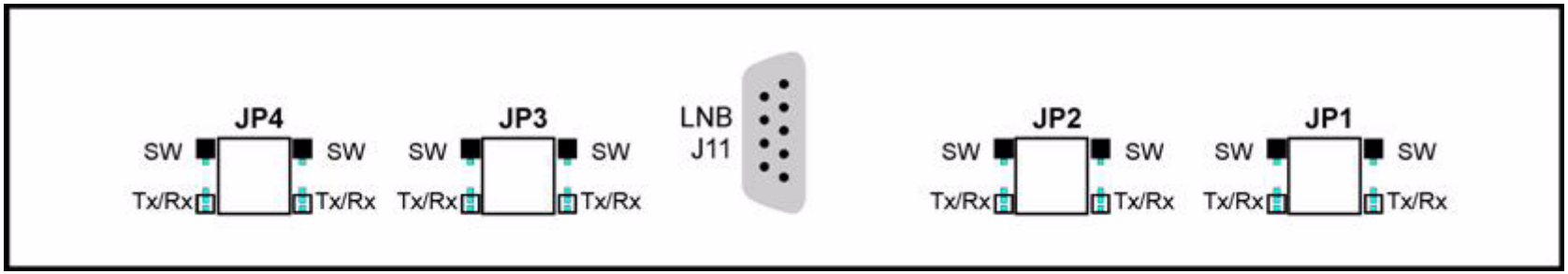



**Figure 11 Jumper Installation: 2040 Switch in slots 2 and 5**

## 2.6 Aligning the Fiber Optic Link

The final step in installing the *7870 Interfacility Link* is re-adjusting the Receiver Gain Control for unity gain.

**To set the unity gain (standard version)**

1. Set the Signal Generator to -15 dBm. Alternatively measure the operational input level.
2. Set up the system as shown in **Figure 12 Fiber Optic Alignment Setup**
3. Adjust the Receiver Gain Control for -15 dBm reading on the power meter.

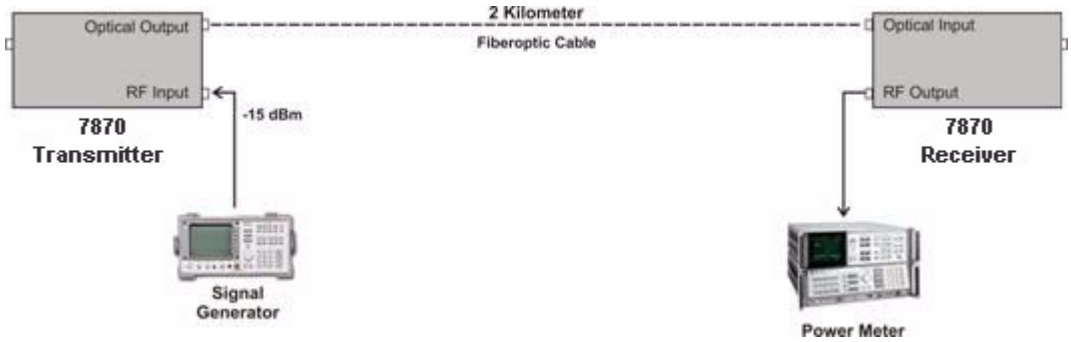



**Figure 12 Fiber Optic Alignment Setup**

# 3 Product Specifications

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3.4.3 7180M and Redundancy Switching . . . . . 24

## 3.1 *7870 Interfacility Link* Specifications

| RF Specifications | |
|---|---|
| **Frequency range** | 10 - 200 MHz |
| **Flatness 10 – 200 MHz @ unity gain** | ± 0.4 dB [typical] |
| **Flatness @ 36 MHz** | ± 0.2 dB [max.] |
| **CNR** | 45 dB @ 36 MHz |
| **Noise Figure [50 Ω]** | |
| **@ unity gain / 1 dB optical loss**<br>**@ unity gain / 8 dB optical loss[1]** | 28 dB [typical]<br>35 dB [typica] |
| **Noise Figure [75 Ω]** | |
| **@ unity gain / 1 dB optical loss**<br>**@ unity gain / 8 dB optical loss[1].** | 30 dB [typical]<br>37 dB [typica] |
| **OIP3 @ -10 dBm in / 0 dBm out** | 24 dBm |
| **Group delay variation @ 20 - 200 MHz** | <1 nSec |
| **Input /output impedance** | 75 Ω [50 Ω optional] |
| **Third order modulation** | - 50 dBc with 2 equal carrier, total input power -5 dBm |
| **Input signal range [total power]** | -25 to - 5 dBm |
| **Output signal range [total power]** | -25 to - 5 dBm |
| **Maximum input without damage** | +10 dBm |
| **Receiver gain control** | Manual |
| **RF connector** | BNC female [default]<br>F, and SMA [optional] |
| **Test port coupling** | **20 dBc** |

**Table 3 *7870 Interfacility Link* Specifications**

1. @ 10 dB Link Gain

| Optical Specifications | |
|---|---|
| **Optical Wavelength** | 1310 ± 10 nm |
| **Optical power output** | 0.5 mW/-2 dBm [minimum] |
| **Optical connector** | FC/APC |
| **Optical budget / distance** | 16 dB / 40 Km |
| **Optical return loss** | -60 dB |
| **Optical connector loss** | 0.5 dB/mated pair |
| **Physical Specifications** | |
| **Chassis capacity** | 8 plug-ins, and 2 power supplies |
| **Chassis size** | 19” × 3U × 7” |
| **Power for rackmount [max.]** | 100 to 240 VAC 50/60Hz 90 Watts |
| **Standalone size** | 5” × 4.8” × 1.3” |
| **Power for standalone** | |
| **Transmitter** | +14 VDC @ 200 mA max.<br>[300 mA temp.< 10° C) |
| **Receiver** | +14VDC @ 250 mA max. |
| **Operating Temperature Range** | -10°C to +55°C |
| **Storage Temperature Range** | -40°C to +85°C |
| All specifications are subject to change without prior notice | |

**Note** If the link is between 100 - 500 meters, foxcom technicians will limit the output power to +2 dBm/1.6 mW. This information must be given to Foxcom when ordering the link.

## 3.2 Model Dimensions

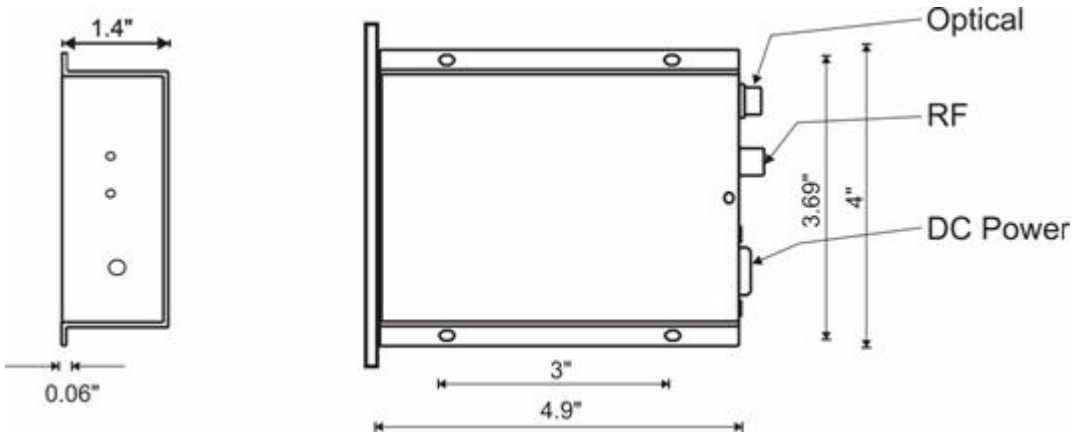


**Figure 13 Unit dimensions**

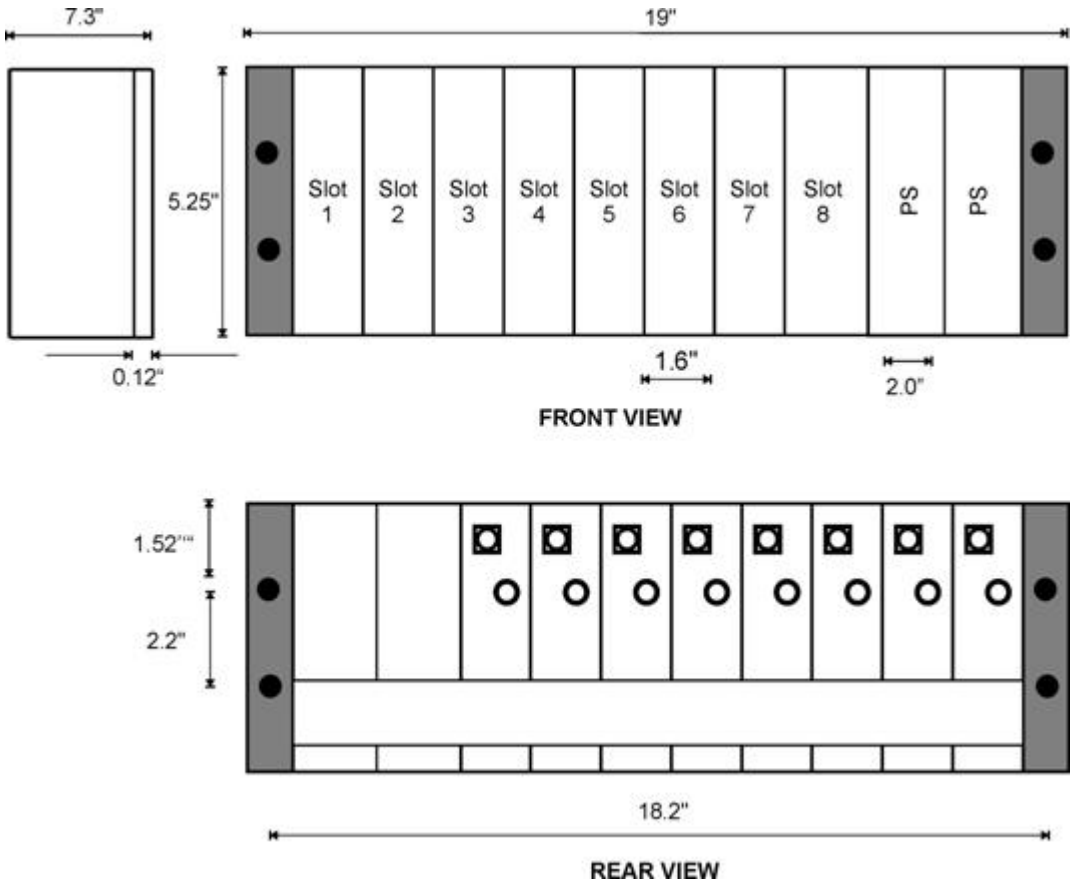


**Figure 14 7810M Chassis Dimensions**

# 3.3 *7870 Interfacility Link* Pinouts

### 3.3.1 Transmitter Pinout

| Standalone 9-Pin Connector [J13] | 7180M Chassis Backplane Connector | 2380 Relay Adapter Connector | Name | Description |
|---|---|---|---|---|
| 1 | — | — | +14V Power | 200 mA [max ≥ 10°C][1] |
| 2 | — | — | Spare | Not Used |
| 3 | J11-P9, J12-P25 J13-P25 | J4-P25 | GND | Chassis Ground |
| 4 | J13-P1 to J13-P8 | J4-P1 to J4-P8 | RSSI | RF signal strength indicator: range 0.2 - 10 V |
| 5 | J13-P9 to J13-P16 | J4-P9 to J4-P16 | PDI | Indicates laser optical power: range -4.2 to 4.8 |
| 6 | J13-P17 to J13-P24 | J4-P17 to J4-P24 | LSRI | Indicates Laser Bias; Range |
| 7 | J12-P1 to J12-P8 | J2: P1-P2 P3-P4, P5-P6 P7-P8, P9-P10 P11-P12, P13-P14 P15-P16 | RFA | RF Alarm: Open collector interface.[2] Sinks current when RF level is low, up to 30 mA. |
| 8 | J12-P9 to J12-P16 | See note below | OPTA | **O**ptical **A**larm: Open Collector Interface[2]. Sinks current at low optical, up to 30 mA. |
| 9 | J11-P1 to J11-P6 | | Spare | Not used |

**Table 4 7870T Transmitter Pinout**

1. 300 ma below 10°C
2. If the 2380 Relay Adapter is installed, the alarms are dry contact. See **Appendix 3 The 2380 Relay Adapter** on page 33.

**Note** If a 2380 Relay Adapter is installed RF and Optical Levels are measured together; the alarm indicates a problem in either the RF or Optical Levels.

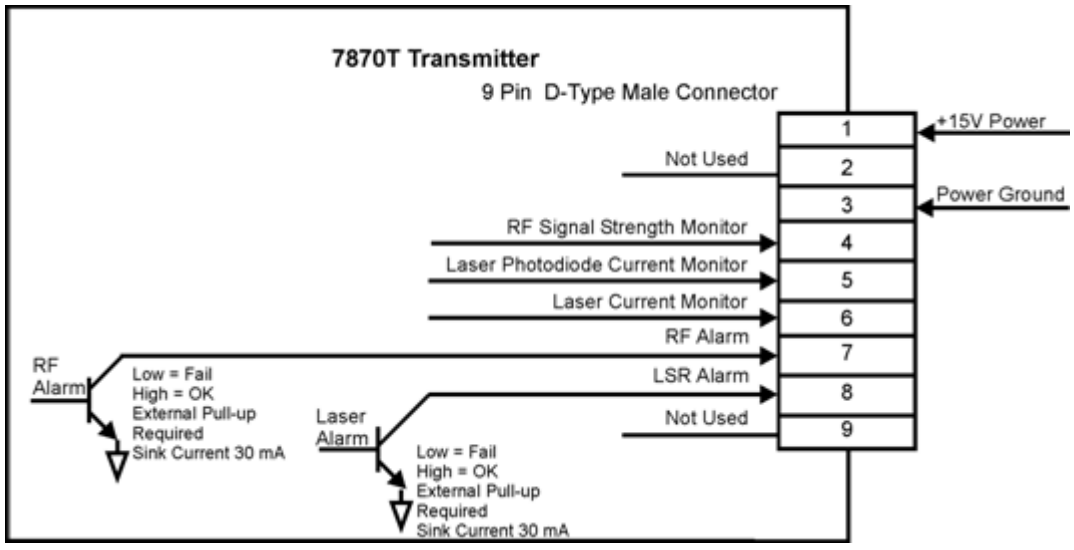


**Figure 15 7870T Transmitter pinout**

### 3.3.2 Receiver Pinouts

| Standalone 9 Pin Connector [J14] | 7180M Chassis Backplane Connector | 2380 Relay Adapter Connector | Name | Description |
|---|---|---|---|---|
| 1 | — | — | +14V Power | 350 mA |
| 2 | — | — | Spare | Not Used |
| 3 | J11-P9<br>J12-P25<br>J13-P25 | J4-P25 | GND | Chassis Ground |
| 4 | J13-P1 to J13-P8 | J4-P1 to J4-P8 | RSSI | RF signal strength indicator:<br>range 0.2 - 10 V |
| 5 | J13-P9 to J13-P16 | J4-P9 to J4-P16 | PDI | Indicates input optical power: 1 V/ 1 m optical power |
| 6 | — | — | Spare | Not used |
| 7 | J12-P1 to J12-P8 | J2: P1-P2<br>P3-P4, P5-P6<br>P7-P8, P9-P10<br>P11-P12<br>P13-P14<br>P15-P16 | RFA | RF Alarm: Open collector interface.[1] Sinks current when RF level is low, up to 30 mA. |
| 8 | J12-P9 to J12-P16 | See note below | OPTA | **O**ptical **A**larm: Open Collector Interface[1]. Sinks current at low optical, up to 30 mA. |
| 9 | — | — | Spare | Not used |

**Table 5 7870R Receiver Pinout**

1. If the 2380 Relay Adapter is installed, the alarms are dry contact. See **Appendix 3 The 2380 Relay Adapter** on page 33.

**Note** If a 2380 Relay Adapter is installed RF and Optical Levels are measured together; the alarm indicates a problem in either the RF or optical levels.

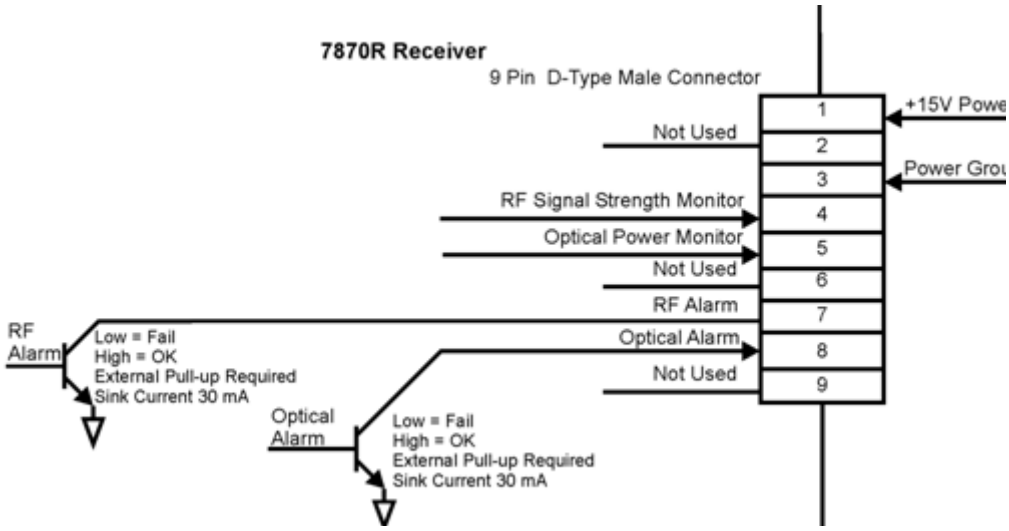


**Figure 16 7870R Receiver pinout**

**Caution** *When monitoring the voltage outputs use only a high resistance DVM.*

## 3.4 7180M Chassis Pinouts

The unit's pins are found at the backplane of the 7180M chassis. The 7180M chassis backplane incorporates eight slots. Pinouts from the 9-pin connector at each slot are sent through the backplane assembly to the two 25-pin D-connectors, J12 and J13, and one 9-pin connector, J11[3]. Any monitor voltages to be measured may be done between the chassis ground and the required pin.

For more information about pinouts, see **Appendix 4 Pinout Charts and Diagrams** on page 41.

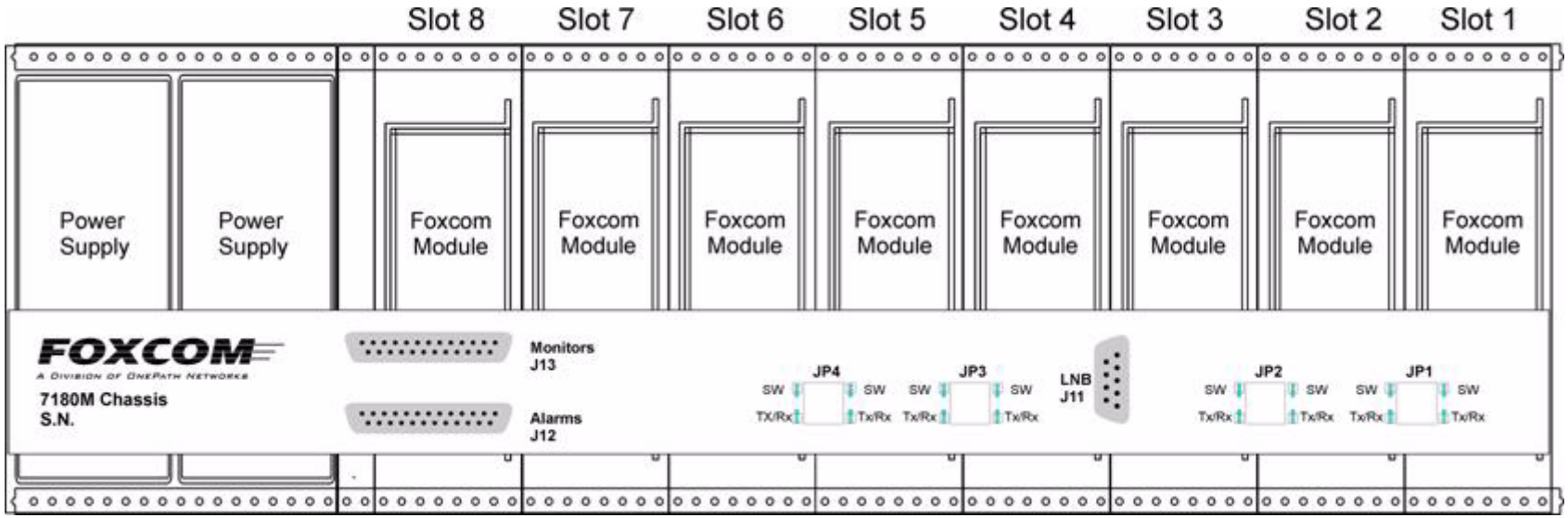


**Figure 17 7180M Chassis rear view**

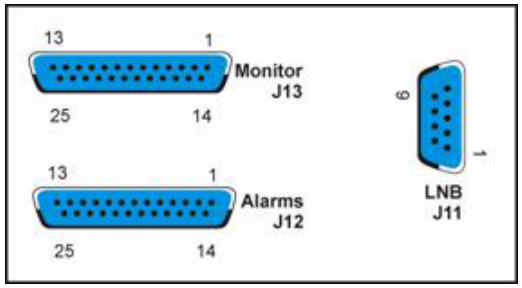


**Figure 18 7180M Chassis Pin numbers**

3. In the **7870** the J11 connector is inoperative.

### 3.4.1 7180M Alarm Connector Pinouts [J12]

| Pin No. | Function | Name | Slot No. |
|---|---|---|---|
| **1** | RF Alarm | RfAlm1 | 1 |
| **2** | RF Alarm | RfAlm2 | 2 |
| **3** | RF Alarm | RfAlm3 | 3 |
| **4** | RF Alarm | RfAlm4 | 4 |
| **5** | RF Alarm | RfAlm5 | 5 |
| **6** | RF Alarm | RfAlm6 | 6 |
| **7** | RF Alarm | RfAlm7 | 7 |
| **8** | RF Alarm | RfAlm8 | 8 |
| **9** | Optical Alarm | OptAlm1 | 1 |
| **10** | Optical Alarm | OptAlm2 | 2 |
| **11** | Optical Alarm | OptAlm3 | 3 |
| **12** | Optical Alarm | OptAlm4 | 4 |
| **13** | Optical Alarm | OptAlm5 | 5 |
| **14** | Optical Alarm | OptAlm6 | 6 |
| **15** | Optical Alarm | OptAlm7 | 7 |
| **16** | Optical Alarm | OptAlm8 | 8 |
| **17** | | | |
| **18** | | | |
| **19** | | | |
| **20** | | | |
| **21** | Standby Power Supply | SPSNOP | |
| **22** | Standby Power Supply | SPSCOM | |
| **23** | Main Power Supply | MPSNOP | |
| **24** | Main Power Supply | MPSCOM | |
| **25** | Chassis Ground | GND | |

**Table 6 7180M Alarm Connector [J12] Pinouts**

### 3.4.2 7180M Monitor Connector Pinout [J13]

| Pin # | Function | Name | |
|---|---|---|---|
| **1** | RSSI Monitor | RSSI | 1 |
| **2** | RSSI Monitor | RSSI2 | 2 |
| **3** | RSSI Monitor | RSSI3 | 3 |
| **4** | RSSI Monitor | RSSI4 | 4 |
| **5** | RSSI Monitor | RSSI5 | 5 |
| **6** | RSSI Monitor | RSSI6 | 6 |
| **7** | RSSI Monitor | RSSI7 | 7 |
| **8** | PDI Monitor | RSSI8 | 8 |
| **9** | PDI Monitor | PDI1 | 1 |
| **10** | PDI Monitor | PDI2 | 2 |
| **11** | PDI Monitor | PDI3 | 3 |
| **12** | PDI Monitor | PDI4 | 4 |
| **13** | PDI Monitor | PDI5 | 5 |
| **14** | PDI Monitor | PDI6 | 6 |
| **15** | PDI Monitor | PDI7 | 7 |
| **16** | PDI Monitor | PDI8 | 8 |
| **17** | LSRI Monitor | LSR1 | 1 |
| **18** | LSRI Monitor | LSR2 | 2 |
| **19** | LSRI Monitor | LSR3 | 3 |
| **20** | LSRI Monitor | LSR4 | 4 |
| **21** | LSRI Monitor | LSR5 | 5 |
| **22** | LSRI Monitor | LSR6 | 6 |
| **23** | LSRI Monitor | LSR7 | 7 |
| **24** | LSRI Monitor | LSR8 | 8 |
| **25** | Chassis Ground | GND | |

**Table 7 7180M Monitor Connector [J13] Pinout**

### 3.4.3 7180M and Redundancy Switching

The 2040 Switch provides optional 1:1 redundancy switching for all Foxcom Interfacility Links. If the customer chooses to add redundancy switching to the link, the pin connector jumpers need to be moved.

Detailed instructions on moving the jumpers are provided in the *Model 2040 1:1 Redundant Switch Installation and User's Guide (Document Number 93-005-26-A2).*

# 4 Troubleshooting

The *7870D Interfacility Link* unit was tested before it left the factory. However if you are experiencing difficulties see the list below for possible solutions. if you are still experiencing problems, attempt to isolate and identify the malfunctioning unit before consulting Foxcom's technical support.

**Table 8 Troubleshooting the Transmitter**

| Problem | Possible Cause |
|---|---|
| 1. Laser LED not on | a. No DC power to the unit. Possible power supply problem or AC power input problem. Check the power supply fuse.<br>b. Verify LSRI monitor is between -4.2 and -4.8VDC. If not, laser may have overheated. Disconnect power or remove plug and allow to cool. Try again with better airflow.<br>c. If an optical power meter is available, measure the optical power out of the transmitter. The power should between 0.5 mW[-3 dBm]. If an optical power meter is not available, use another receiver to determine if there is optical power emerging from the transmitter (use a 5 meter jumper cable). If there is no optical power, then the transmitter unit is malfunctioning.<br>If any or all the above are not within the guidelines, the transmitter unit is faulty. |
| 2. The RF LED is not lit | The input signal is less than -28 dBm; verify RF signal strength [RSSI] is≤0.2 VDC. [See **Table 4 7870T Transmitter Pinout** on page 20]. Even if slightly out of range, the unit may still function, although it will register an alarm condition. |
| 3. RF LED illuminated - with no input signal | Unit may be receiving stray RF "pick up". Solution: provide RF input or use necessary termination input.` |

**Table 9 Troubleshooting the Receiver**

| Problem | Possible Cause |
|---|---|
| 1. Lack of RF signal present at Receiver, yet optical power is functioning. | If a spectrum analyzer or power meter is not available then use a DVM and adjust the gain control for RF signal strength (RSSI) so that the reading is > 0.2VDC. (See **Table 5 7870R Receiver Pinout** on page 21).<br><br>Conclusion: If signal still not present then transmitter input stage amplifier or receiver amplifier is defective. Contact factory. |
| 2. No optical power, LED not illuminated. | a. Transmitter is not functioning, see above.<br>b. There is a break or severe bend in the fiber optic cable. Use an optical power meter or another functioning receiver unit to verify optical power coming down the fiber.<br>c. The connector is dirty. Clean it.<br>d. Optical power too low, too many splits, too long a distance (thus exceeding optical budget). System *may still function* without LED illuminated although at reduced performance. |
| 3. Optical power light illuminated with disconnected optical input. | Damaged (leaky) photodiode. Unit may still function, otherwise contact Factory for service. |
| 4. The RF LED is not illuminated. | Verify that the RF signal strength (RSSI) is <0.2° VDC. |

# Appendix 1 Cleaning Fiber Optic Connections

**Appendix 1.1 Cleaning Procedures for FC/APC Connectors ..... 28**
**Appendix 1.2 Cleaning Procedure for FC/APC Bulkhead Ports..... 29**
Appendix 1.2.1 Swab Method ..... 29
Appendix 1.2.2 Compressed Air Method ..... 29

The unit has an FC/APC angle polished optical connector for very high optical return loss performance. The units are specified into single mode fiber i.e. 9/125 micron core diameter. Full performance is specified only for low return loss optical plant - meaning that the fiber must be fusion spliced and all connections or splices must have a return loss greater than -60 dB. With these guidelines in mind, link lengths beyond 20 kilometers (DFB based products) can be achieved with high performance. Specific performance and/or design assistance is available by request from Foxcom.

If there is low/no signal or noisy signal at a Foxcom module, the connector should be cleaned. Dirt on the inside connector tip can impair the flow of light causing problems in signal transmission. Foxcom modules are sealed but dirt can occasionally enter during installation and alignment.

The input and output optical ports of all Foxcom equipment are known in the fiber optic world as bulkhead ports. Foxcom uses
FC/APC connectors.

The following materials are representative of the types of cleaning materials that should be used for cleaning the fiber optic ports and connectors. They are available from several suppliers.

| Description | Manufacturer |
|---|---|
| Kim wipes | Kimberly Clark |
| Cletop Automatic Connector Cleaner | Cletop |
| fiber optic Swab | Cletop or FIS |
| fiber optic Compressed Air | Chemtronics |

**Table 10 Cleaning materials**

Wiping clothes should be made of lint free alcohol free nonabrasive materials. Swabs should have a tightly wrapped tip and be talcum- free. For removing dust from receptacles, a canned compressed gas is recommended. Do not use commercial compressed air because of risk of contamination.

## Appendix 1.1 Cleaning Procedures for FC/APC Connectors

Use a Kim Wipe to gently wipe the end face surface of the connector. Alternatively a Cletop automatic connector cleaner can be used.

**Figure 19 Wiping the connector with a Kim wiper**

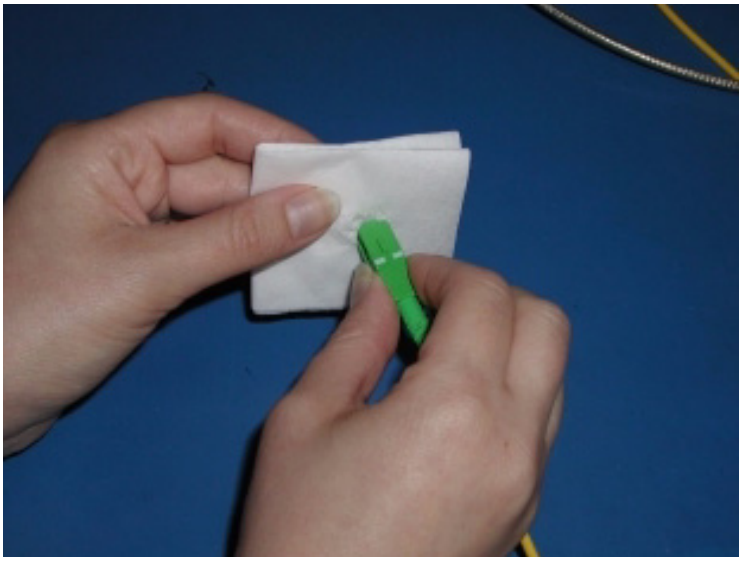

**Figure 20 Wiping the connector with a Kim wiper [2]**

## Appendix 1.2 Cleaning Procedure for FC/APC Bulkhead Ports

**Caution** *Clean the transmitter and receiver optical ports only when there is evidence of contamination or reduced performance.*

### Appendix 1.2.1 Swab Method

Using a clean fiber optic cleaning swab, gently wipe out the optical port. Discard the swab after use.

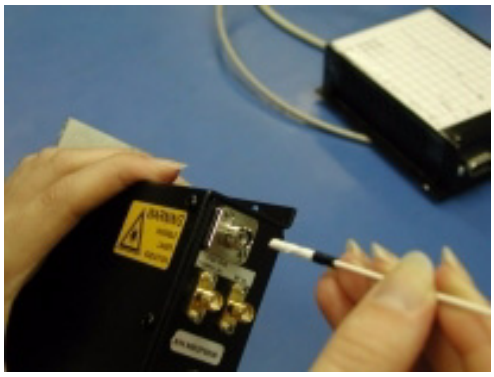

**Figure 21 Cleaning the Optical Port**

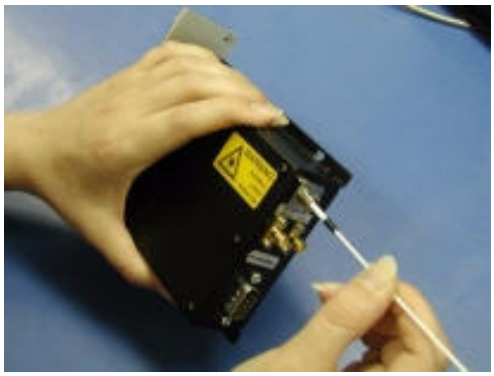

**Figure 22 Cleaning the Optical Port [2]**

### Appendix 1.2.2 Compressed Air Method

Using the extension tube of the compressed air, blow into the port to remove any dust or debris. Do not allow the tube to touch the bottom of the port. Do not use commercial compressed air due to potential oil contamination.

**Note** To prevent contamination, the optical ports should be connected or covered with a dust cap at all times.

Use dry air or nitrogen only.

# Appendix 2 Installing a Standalone Unit

**To install the *7870*T-STD or *7870*R--STD Standalone:**

1. Place the *7870* unit on the standalone flange, matching the holes.
2. Using four screws (#4 or #6) secure the unit and the flange to the wall.
3. Apply AC power to the standalone power supply unit.
4. Connect the *7870* unit to the power supply. The Laser LED should be lit.

All remaining steps are the same as in the product manual. See sections **2.1 Setting up the Transmitter** on page8 and **2.3 Setting Up the Receiver** on page10.

# Appendix 3 The 2380 Relay Adapter

**Appendix 3.1 Installing the 2380 Relay Adapter ..... 34**
Appendix 3.1.1 Parts Required for Installing the 2380 ..... 34
Appendix 3.1.2 Mounting the the 2380 Relay Adapter ..... 34
**Appendix 3.2 2380 Dimensions and Front Panel Label..... 36**
**Appendix 3.3 2380 Adapter Pinouts..... 37**

The following section describes how to install the 2380 Relay adapter onto the 7180M Chassis. The 2380 Relay adapter assembly provides dry contact output signals as an option to the standard open collector signals available on the 7180M chassis backplane.

If the 2380 Relay adapter is ordered separately from the 7180M chassis, it must mounted by the user. The 2380 is mounted directly over the connectors on the 7180M backplane, as shown below.

# Appendix 3.1 Installing the 2380 Relay Adapter

## Appendix 3.1.1 Parts Required for Installing the 2380

- 2380 Relay Adapter
- Two pin guides
- Four one-inch screws
- Screw driver

## Appendix 3.1.2 Mounting the the 2380 Relay Adapter

1. **Very Important**: Disconnect the electricity **before** performing this procedure.
2. Make sure that you have all the needed equipment.
3. Install the pin guides.

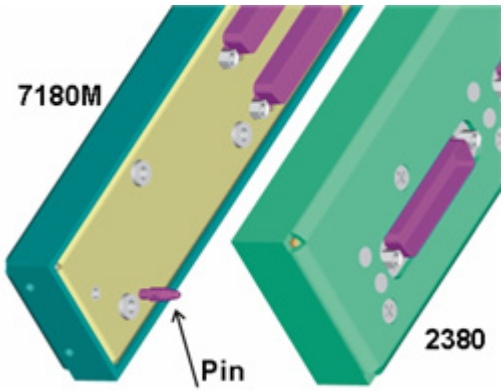


**Figure 23 Installing the guide pins**

4. Mount the unit onto the pin guides.

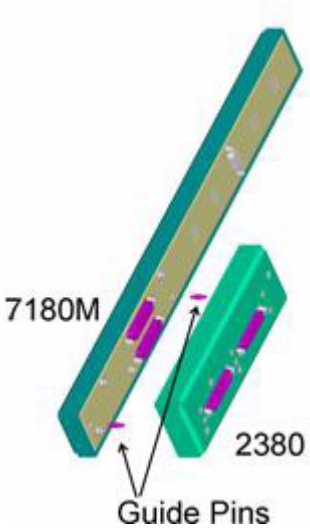


**Figure 24 Mounting the adapter**

5. Mount the four screws. The screws must be installed in the order shown in **Figures 25** and **26**.

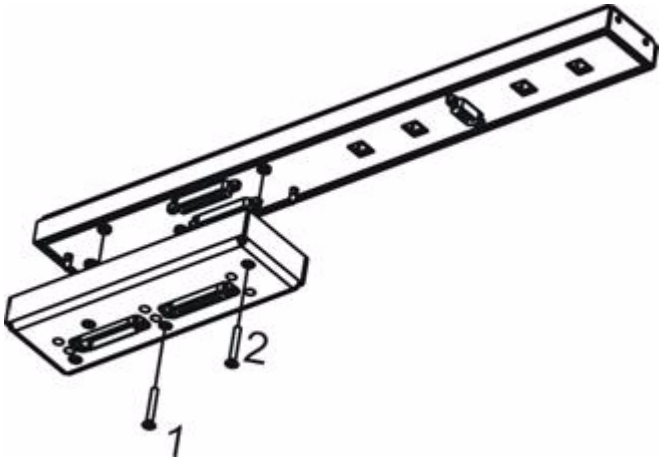


**Figure 25 Mounting the Screws [1]**

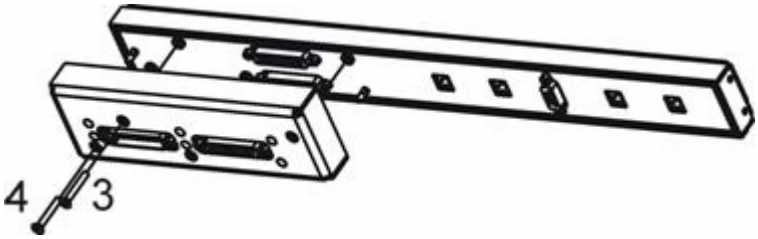


**Figure 26 Mounting the screws [2]**

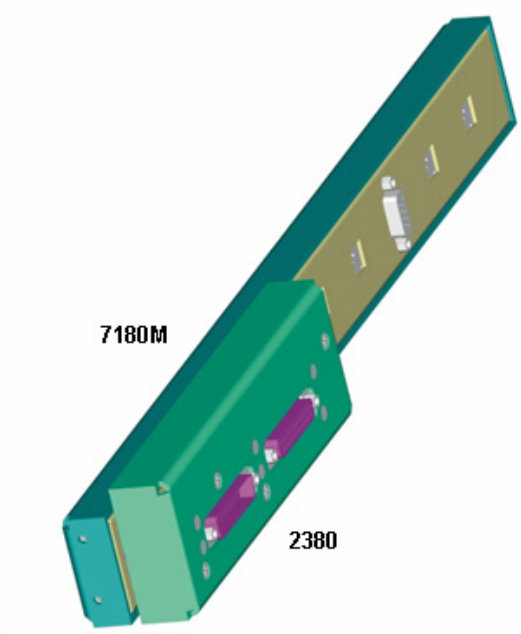


**Figure 27 Mounted 2380 Adapter**

**Caution** *Use only the mounting screws provided by Foxcom. Other screwa can permanently damage the unit!*

## Appendix 3.2 2380 Dimensions and Front Panel Label

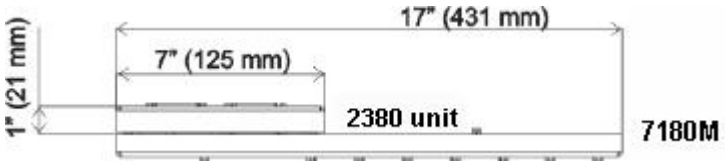


**Figure 28 2380 Dimensions**

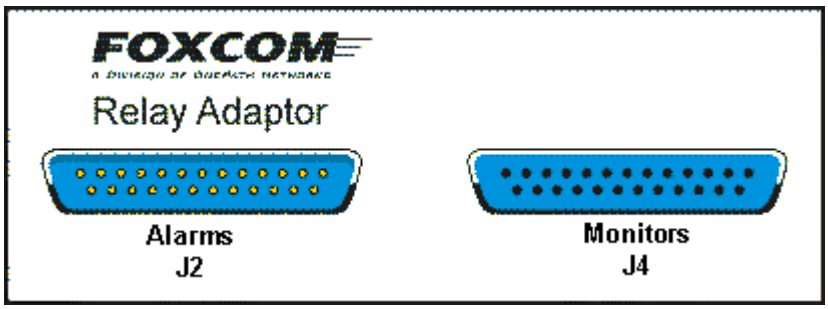


**Figure 29 2380 Front Label**

## Appendix 3.3 2380 Adapter Pinouts

**Table 11 2380 Alarms Pinouts [J2]**

| Pin Number | Function | Name | Slot Number |
|---|---|---|---|
| 1 | Alarm | NOP1 | 1 |
| 2 | Alarm | COM1 | 1 |
| 3 | Alarm | NOP2 | 2 |
| 4 | Alarm | COM2 | 2 |
| 5 | Alarm | NOP3 | 3 |
| 6 | Alarm | COM3 | 3 |
| 7 | Alarm | NOP4 | 4 |
| 8 | Alarm | COM4 | 4 |
| 9 | Alarm | NOP5 | 5 |
| 10 | Alarm | COM5 | 5 |
| 11 | Alarm | NOP6 | 6 |
| 12 | Alarm | COM6 | 6 |
| 13 | Alarm | NOP7 | 7 |
| 14 | Alarm | COM7 | 7 |
| 15 | Alarm | NOP8 | 8 |
| 16 | Alarm | COM8 | 8 |
| 17 | | | |
| 18 | | | |
| 19 | | | |
| 20 | | | |
| 21 | | | |
| 22 | | | |
| 23 | Main PS Alarm | MPSA | |
| 24 | Standby PS Alarm | SPSA | |
| 25 | Power Supply Comm. | PSCOM | |

**Note** Alarms in Pins 1 through 16 function if there is either an RF or Optical signals failure.

**Table 12 7180M Monitor Connector [J4] Pinout**

| Pin # | Function | Name | Slot No. |
|---|---|---|---|
| 1 | RSSI Monitor | RSSI1 | 1 |
| 2 | RSSI Monitor | RSSI2 | 2 |
| 3 | RSSI Monitor | RSSI3 | 3 |
| 4 | RSSI Monitor | RSSI4 | 4 |
| 5 | RSSI Monitor | RSSI5 | 5 |
| 6 | RSSI Monitor | RSSI6 | 6 |
| 7 | RSSI Monitor | RSSI7 | 7 |
| 8 | RSSI Monitor | RSSI8 | 8 |
| 9 | PDI Monitor | PDI1 | 1 |
| 10 | PDI Monitor | PDI2 | 2 |
| 11 | PDI Monitor | PDI3 | 3 |
| 12 | PDI Monitor | PDI4 | 4 |
| 13 | PDI Monitor | PDI5 | 5 |
| 14 | PDI Monitor | PDI6 | 6 |
| 15 | PDI Monitor | PDI7 | 7 |
| 16 | PDI Monitor | PDI8 | 8 |
| 17 | LSRI Monitor | LSRI1 | 1 |
| 18 | LSRI Monitor | LSRI2 | 2 |
| 19 | LSRI Monitor | LSRI3 | 3 |
| 20 | LSRI Monitor | LSRI4 | 4 |
| 21 | LSRI Monitor | LSRI5 | 5 |
| 22 | LSRI Monitor | LSRI6 | 6 |
| 23 | LSRI Monitor | LSRI7 | 7 |
| 24 | LSRI Monitor | LSRI8 | 8 |
| 25 | Chassis Ground | | |

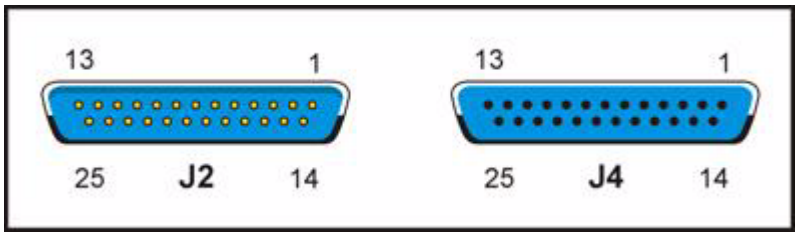


**Figure 30 2380 Pin Number**

# Appendix 4 Pinout Charts and Diagrams

Figures 31 through 36 give detailed pinout information for the 7180M chassis, the 2380 Relay Adaptor and the 2040 RF Switch.

Figure 31 Standard 7180M and 7180M with 2380 Relay Adapter Pinout . . . . . 40
Figure 32 7180M and 2040 RF Switch Pinout . . . . . 41
Figure 33 Pinout of 7180M Jumper with 2040 RF Switch in slots 2 and 5 . . . . . 42
Figure 34 Pinout of 7180M jumper with 2040 RF switch in slot 5. . . . . 43
Figure 35 Pinout of 7180M jumper with 2040 RF switch in slot 5. . . . . 44
Figure 36 Pinout of 7180 jumper with transmitter and receiver units only . . . . . 45

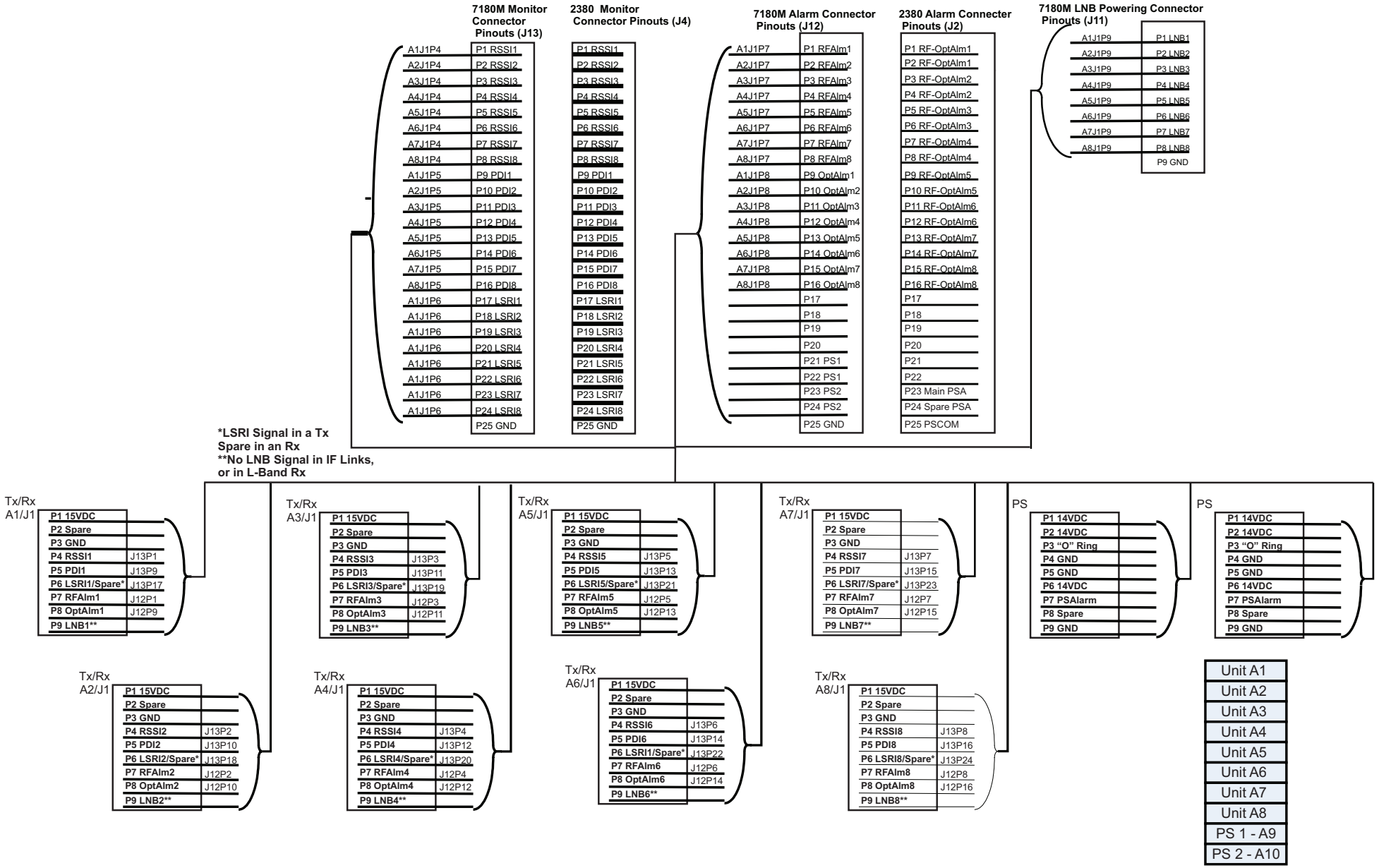


**Figure 31 Standard 7180M and 7180M with 2380 Relay Adapter Pinout**

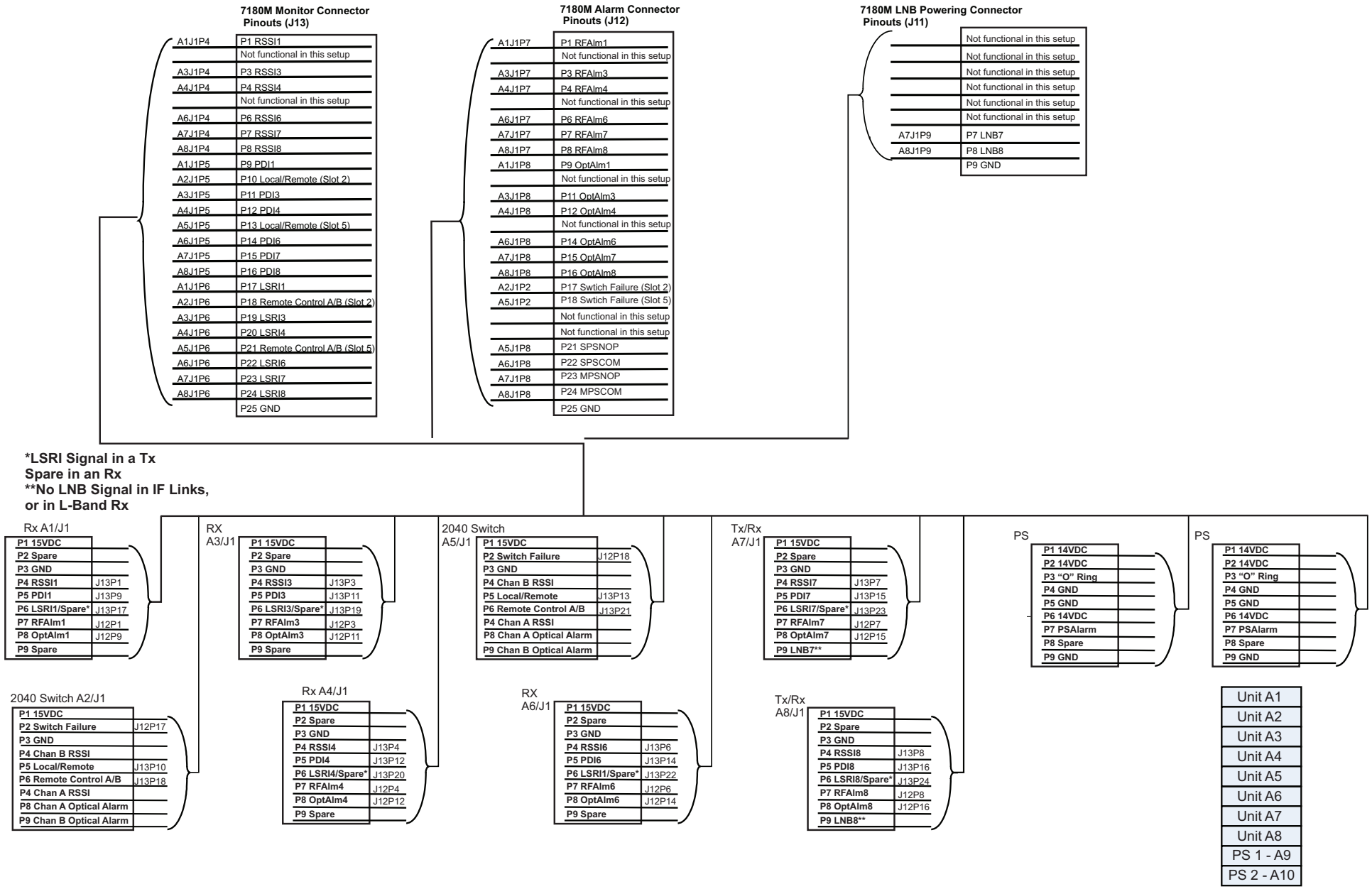


**Figure 32 7180M and 2040 RF Switch Pinout**

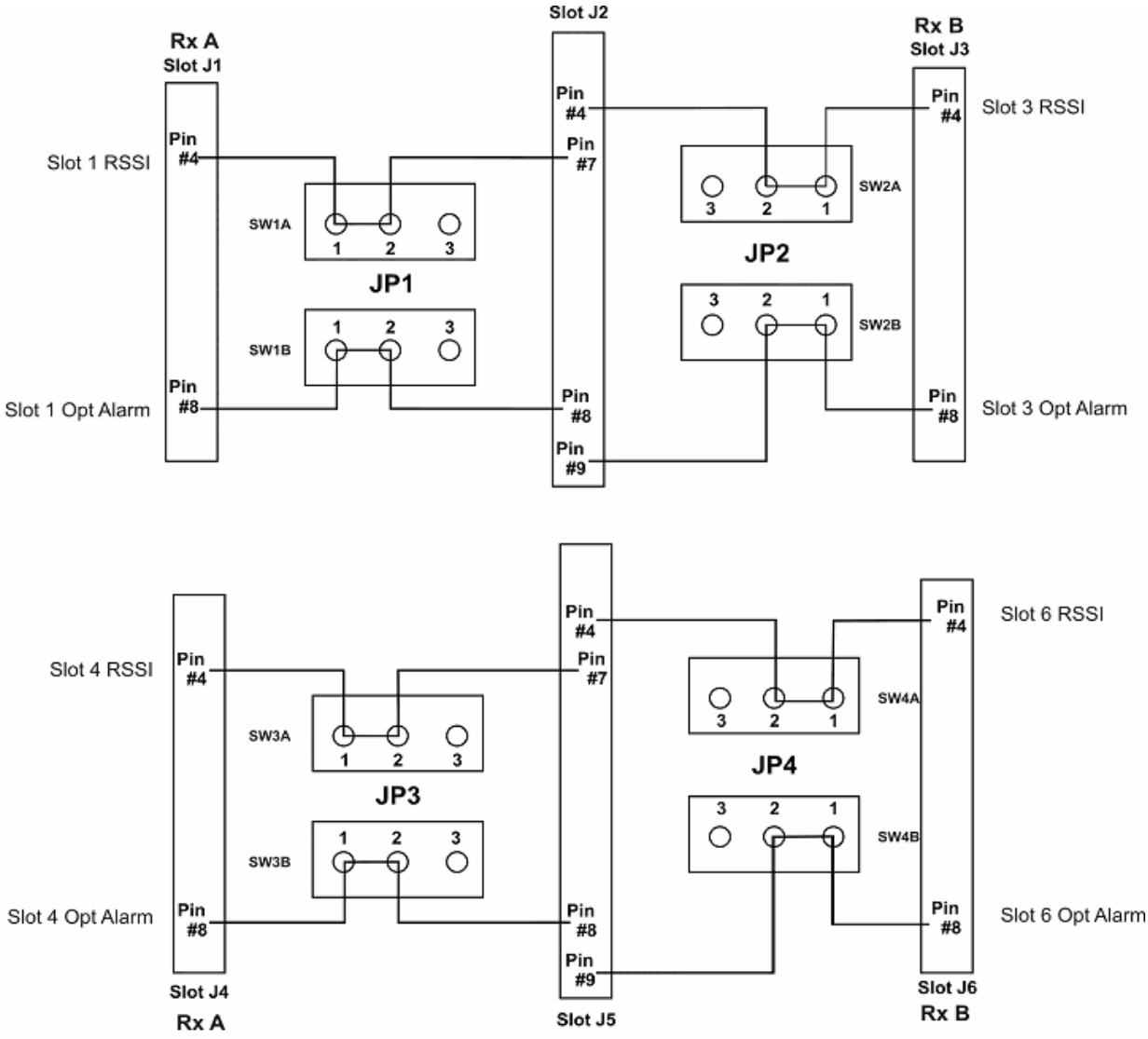


**Figure 33 Pinout of 7180M Jumper with 2040 RF Switch in slots 2 and 5**

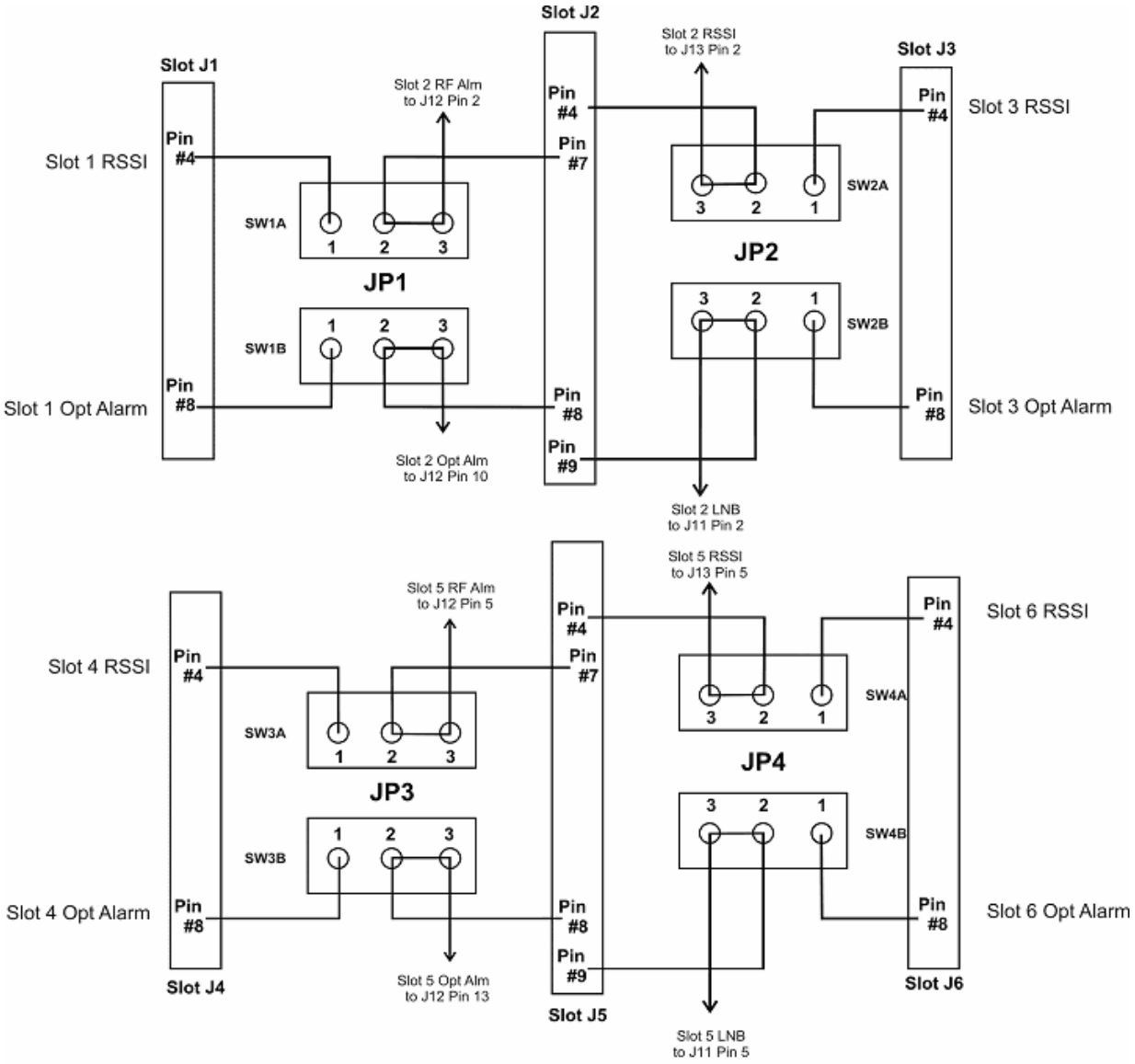


**Figure 34 Pinout of 7180M jumper with 2040 RF switch in slot 5**

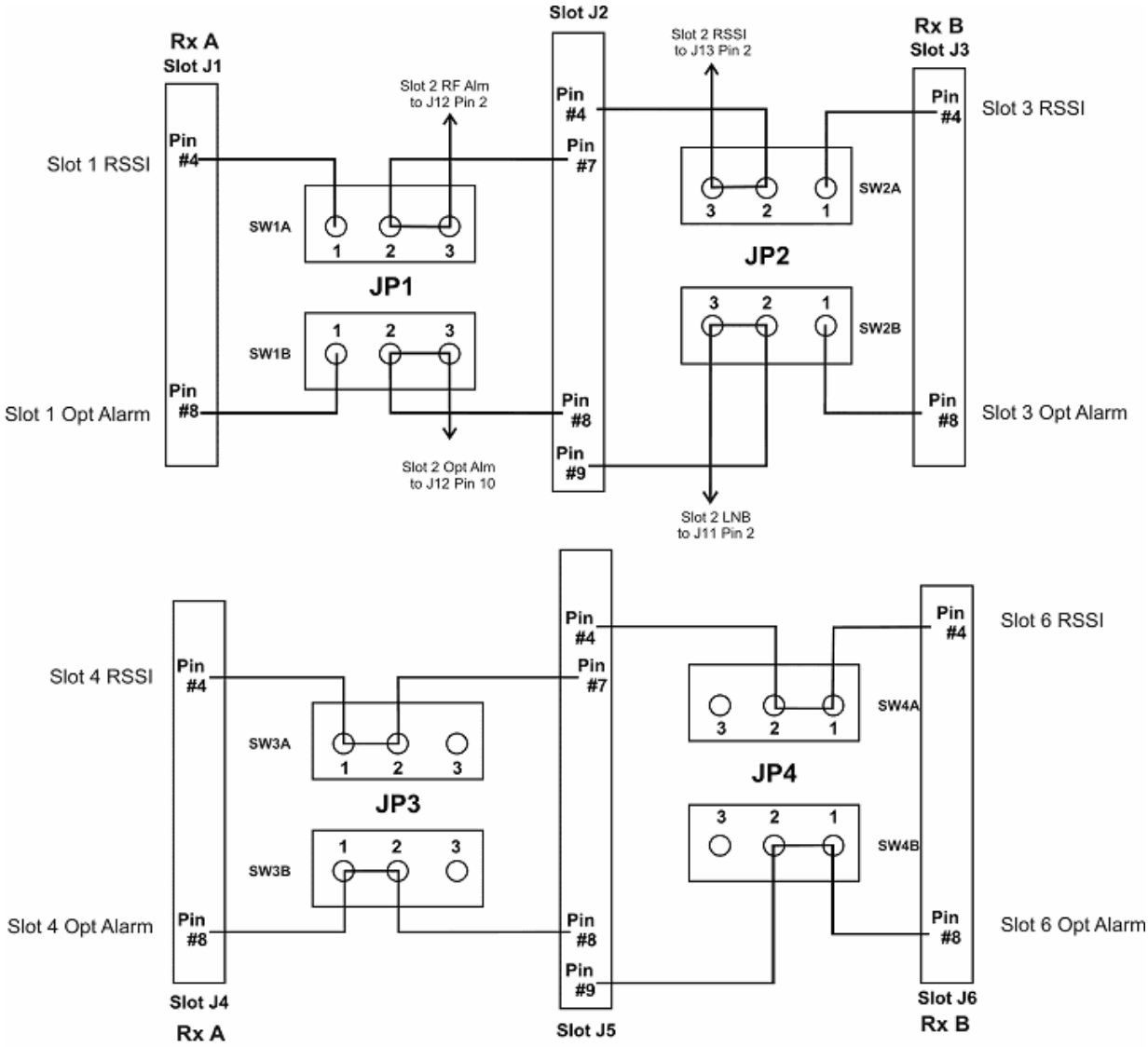


**Figure 35 Pinout of 7180M jumper with 2040 RF switch in slot 5**

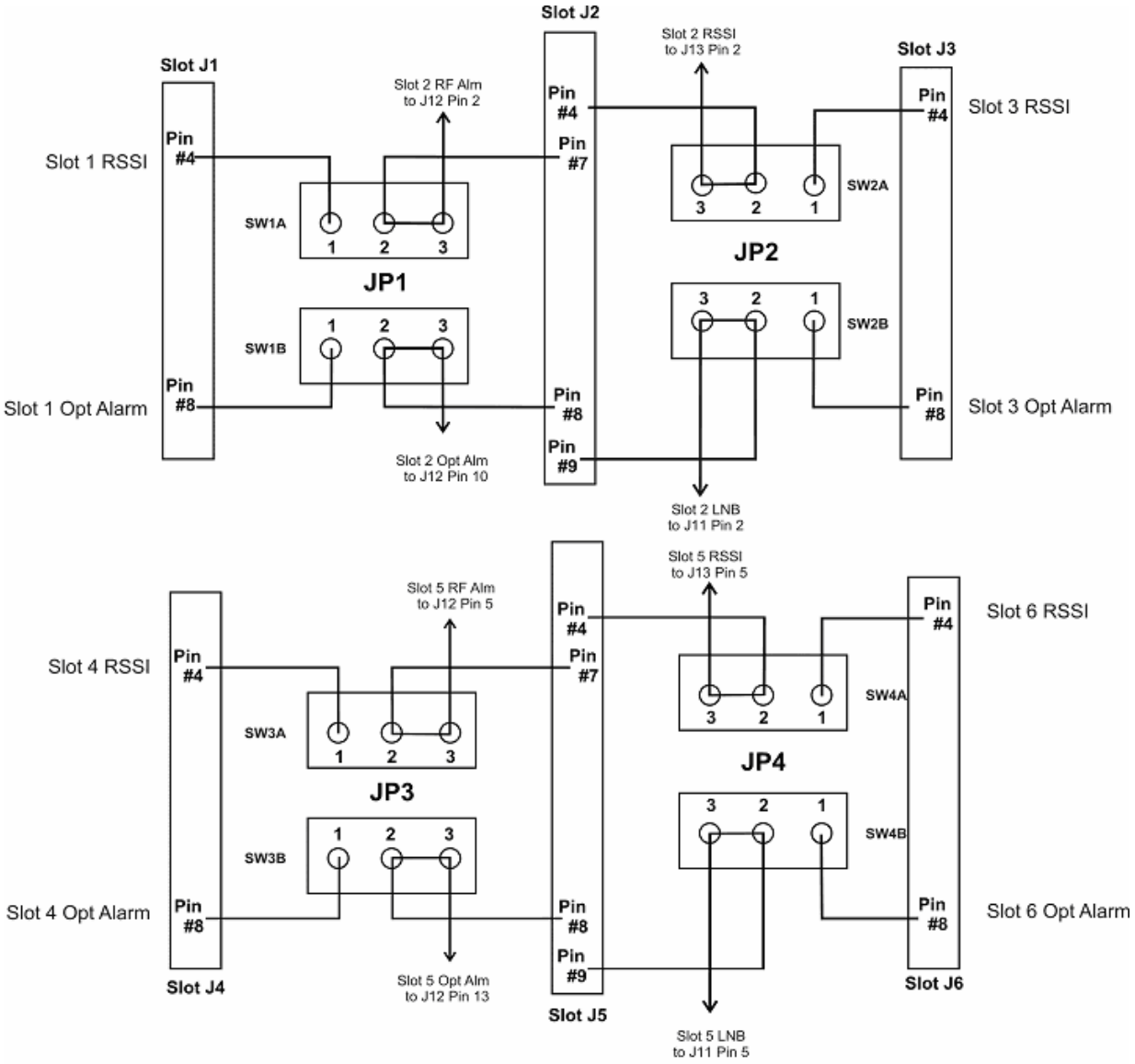


**Figure 36 Pinout of 7180 jumper with transmitter and receiver units only**